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ABSTRACT

The effects of faculty training in sex equitable and effective interaction skills were assessed. Twenty-three professors participated in a two and one-half day training workshop that focused on (1) the elimination of sex-biased teacher-student interactions in the classroom; and (2) the distribution, precision, and quality of teacher responses to students' verbal behavior. Each classroom was observed three times, resulting in 138 (45 minute) observations. The INTERSECT Observation Instrument was used by five trained observers to code classroom interactions for each observation. Compared to a matched control group of 23 professors, the teachers who underwent training had significantly more interactions with students. Training increased interaction by 38%, reduced the percentage of salient students who monopolized interaction, and also reduced the percentage of silent or nonparticipating students. More students participated more equitably in the classrooms of the trained teachers. Training also increased the range and precision of professor reactions to student responses. Over half of the untrained teachers' reactions were in the acceptance category (a non-evaluative, diffuse response), while trained professors used more praise, remediation, and criticism, which gave more precise and helpful feedback to students. (Author/SW)

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THE EFFECTS OF TEACHER SEX EQUITY AND EFFECTIVENESS TRAINING ON CLASSROOM INTERACTION AT THE UNIVERSITY LEVEL

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THE EFFECTS OF TEACHER SEX EQUITY AND EFFECTIVENESS TRAINING ON CLASSROOM INTERACTION AT THE UNIVERSITY LEVEL

ABSTRACT

This Static-Group Comparison Study provides a data-based analysis for determining if the independent variable, training of college professors in sex equitable and effective interaction skills, significantly changes the nature of teacher-student interaction in the experimental classrooms as compared to a matched control group.

Total sample size was 46 professors and classrooms at an urban university. Twenty-three experimental professors participated in a two and a half day training workshop which focused on (1) the elimination of sex-biased teacher-student interactions in the classroom, and (2) the distribution, precision and quality of teacher responses to students' verbal behavior. Each classroom was observed three times resulting in 138 (45 minute) observations.

The dependent variable was the INTERSECT Observation Instrument which was used by five trained observers to code classroom interactions for each observation.

Significant differences between the experimental and control groups were found in the frequency of teacher-student interaction. Training increased interaction by 38 percent, reduced the percentage of salient students who monopolize interaction, and also reduced the percentage of silent or non-participating students. More students participated more equitably in the classrooms of the trained group.

Training increased the range and precision of professor reactions to student responses. Over half of the control professors' reactions were in the acceptance category (a non-evaluative, diffuse response such as "uh huh" or "OK"). Trained professors used more praise, remediation and criticism, which give more precise and helpful feedback to students.

In investigating gender bias at the postsecondary level, this study revealed significant bias in favor of male students in the control group while the experimental group approached equity.

Clearly the provision of training to college professors in sex equitable and effective interaction skills contributes to the overall goal of excellence in higher education. This training increased classroom interaction, including students participation, as well as the range and precision of professor reactions to all students. It reduced gender bias in the quantity and quality of interactions.

Literature Review

Postsecondary women today earn approximately half the bachelor's and master's degrees awarded each year, one-third of the doctoral degrees, and one-quarter of the profession degrees (Klein & Bogart, 1984). Perhaps this increase in women's academic interest and accomplishments can be attributed, in part to the advent of Title IX of the Educational Amendments of 1972, which required major changes to take place throughout the educational system to promote equal opportunities for males and females and prohibit sex discrimination in schools.

Yet, more than one decade after the passage of Title IX, sex bias still pervades the classroom (Sadker, 1984). For example, in elementary, secondary, and postsecondary classrooms, male students receive more teaching attention than female students. Female students are less likely to participate in classroom discussions and are more likely to be invisible members of classrooms (Sadker & Sadker, 1982b; Thomas, 1983).

However, even teachers who are committed to equity in education are likely to be unaware of differences in the way they treat men and women in their classrooms and how these differences and inequities emerge in classroom interaction (Sadker, Thomas, & Sadker, 1982). These inequities are usually unintentional and subtle, "caused by socialization that affects not only teachers but all members of society. Teachers themselves are products of a society where sexism is prevalent" (Sadker & Sadker, 1980a, p. 5). Ricks and Pyke (1973) suggest that teachers not only fit the mold of traditional sex roles, but contribute to maintaining traditional expectations about

male-female roles which have, and do, lead to differential treatment of students based on sex (Thomas, 1983). While difficult to document, these attitudes and expectations can be studied through instrumental observation of classroom interactions.

A few findings pertaining to sex bias in teacher-student classroom interaction at the postsecondary level can be documented. Thomas (1983) found that male students have more interactions with their teachers than expected, while female students have fewer interactions than expected, indicating the presence of sex bias in Active Teaching Attention. This inequity in favor of males increases during the academic year.

In addition, a handful of students accounts for over 50 percent of the total classroom interactions in postsecondary education (Karp & Yoels, 1976). Many postsecondary female students report that they frequently are ignored, stereotyped, and discriminated against by their instructors (Hall & Sandler, 1982). Content analysis of postsecondary textbooks demonstrates that many college texts continue to stereotype male and female roles and exclude women from the narrative content (Sadker & Sadker, 1979). Thomas also found that students self-segregate on the basis of gender to a high degree in their choice of classroom seating.

Another aspect of teacher-student interaction which needs to be be examined is the frequency of interaction in the postsecondary classroom. Although decades of research indicate that active student participation in the classroom is related to higher achievement and more positive attitudes toward school, studies document the following patterns: As grade levels increases,

classrooms become less interactive. Elementary classrooms are more interactive than high school classrooms. High school classes are more interactive than college classes" (Sadker & Sadker, 1982b).

Another concern is the quality and distribution of teacher feedback reactions to student comments or questions. Study after study on teacher effectiveness demonstrates that clear and specific teacher feedback is related to student achievement (Squires, 1983). Despite this research, teachers at all levels provide diffuse feedback during classroom discussion and tend to accept student responses with comments such as "uh-huh" and "OK." There is more diffuse acceptance (the "uh-huh" response) in postsecondary classrooms than praise, remediation, and criticism combined (Thomas, 1983). Non-specific, diffuse teacher feedback contributes to an educationaly bland and flat environment (Sizer, 1984).

This postsecondary study investigated the effects of teacher training on (1) equity in teacher-student interaction and (2) the frequency, quality, effectiveness, and distribution of teacher reactions to student behaviors. If excellence and equity in teaching are to be achieved, specifically in terms of feedback, communication, and "communion" between teacher and student, more research is urgently needed regarding the components of classroom interaction.

Research Questions

1. Does a faculty training program in sex equitable and effective interaction skills increase the amount of classroom interaction?

2. Do college professors who are trained in sex equitable and effective interaction skills show different frequencies of reactions to students' responses in the categories of Praise, Acceptance, Remediation, and Criticism?

3. Do college professors who are trained in sex equitable and effective interaction skills show a more equitable distribution of classroom interactions to male and female students than college professors who are not trained.

4. Is there a difference between the experimental and control group in the distribution of teacher reactions by gender in each of the categories of Praise, Acceptance, Remediation, and Criticism?

5. Does training in sex equitable and effective interaction skills result in a significantly smaller percentage of salient students in the experimental group versus the control group?

6. Does training in sex equitable and effective interaction skills reduce the percentage of silent students in the experimental group versus the control group?

Methodology

Twenty-three experimental professors from a variety of disciplines and schools at a large, urban university volunteered for Project EFFECT's training program. The independent variable included a two and a half day August workshop and a one day follow-up session in October for the twenty-three experimental professors. Professors Myra and David Sadker directed the training, which included a review of salient research; an analysis of videotapes and films, demonstrating both biased and

equitable behaviors and role playing. Each experimental professor presented a ten minute microteaching lesson to practice and demonstrate (1) equitable distribution of teacher attention and (2) precise and affective responses to students' comments and questions in the categories of praise, acceptance, remediation, and criticism. Feedback from a trained observer (who coded the interactions on the INTERSECT observation form, Section B) and, in some cases, a videotape, followed each microteaching lesson. Each professor repeated the microteaching lesson. Each professor repeated the microteaching experience the following day, and approximately seven weeks later for practice and reinforcement, each time receiving immediate observer-coded feedback. (For further information concerning observations and training contact Myra and David Sadker, School of Education, American University, Washington, D.C. 20016. For further information concerning the research reported in this paper, contact Joan Long, School of Education, American University, Washington, D.C. 20016).

Twenty-three control professors, matched-pairs, volunteered to be observed as part of a general classroom interaction study. Over a three month period, each experimental and each control classroom was observed three times, resulting in 138 observations, 69 of which were treatments and 69 of which were control. Five trained observers, with an interrater reliability of .85 or higher, used the INTERSECT observation instrument to code classroom interactions for each 45 minute observation.

The INTERSECT Observation System was developed by the Network, Inc. It "measures patterns of potential bias or equity in the ways teachers and male and female students interact with one another in active classroom interaction" (The Network, Inc., 1981, p. 5). It includes a set of procedures, coding categories, and forms, which allow a trained observer to enter a classroom and systematically record behaviors that are significant in determining the degree of bias or equity in the ways teachers interact with male and female students.

The INTERSECT Observation System was developed and refined as a result of (1) a review of sex equity research and bias in classroom interaction; (2) an analysis of existing instrumentation for observing and recording classroom interaction; (3) the development of coding forms, based on field testing in 36 elementary and junior high classrooms and on a variety of teacher-training videotapes and films; (4) training of senior staff in observation techniques; (5) consultation with a national review panel of professional experts concerning the refinement of the observation scheme (Thomas, 1983). An Observer's Manual for INTERSECT provides concise definitions and describes recording procedures.

The Coefficient of Distribution

For each observation, the coefficient of distribution was calculated. The coefficient of distribution corrects for differences in the proportion of males and females in attendance. For example, if males receive 60 percent of the interactions in a class where they comprise 60 percent of the

students, the coefficient of distribution would indicate that equity was achieved (c.o.d. = 0).

The coefficient of distribution is the proportion of interactions with male students minus the proportion of males in the class. Positive values of the coefficient of distribution indicate a bias toward males, while negative values indicate bias toward females.

Findings and Conclusions

The INTERSECT observation data were subjected to various statistical analyses to investigate the following research questions:

1. Does a faculty training program in sex equitable and effective interaction skills increase the amount of classroom interaction?

A t-test comparing the two groups on total teacher-student interactions over Observations I, II, and III indicated that there was a significant difference in the frequency of interaction between the two groups, with the trained professors using a higher frequency of interaction ($p = .046$). Thirty-eight percent more interaction was observed in the experimental group ($x = 54.3$ interactions for a 40 minute period, as compared to $x = 39.3$ in the control group). Nineteen out of twenty-three trained professors had more interactive classrooms than their control counterparts. (See Tables 1 and 2)

2. Do college professors who are trained in sex equitable and effective interaction skills show different frequencies of reactions to students responses in the categories of Praise,

TABLE 1

SUMMARY OF DESCRIPTIVE DATA

	Control	Experimental
Number of professors	23	23
Number of students	587	549
Number of observations	69	69
Frequency of interactions	2,712	3,745
Mean interactions per professor	117.9	162.9

TABLE 2

T-TEST FOR DIFFERENCE IN FREQUENCY OF INTERACTION BETWEEN THE CONTROL GROUP AND THE EXPERIMENTAL GROUP FOR OBSERVATIONS I, II AND III

Group	n	M	SD	t	df	p
Control	23	117.9	75.2	2.05	44	.046
Experimental	23	162.9	73.4			

Acceptance, Remediation, and Criticism?

Interactions were totaled across all observations for each professor for each category. Separate t-tests were calculated to compare the mean number of interactions occurring in the two groups for each category. Analysis indicated that the trained professors used a significantly higher frequency of praise (p = .001), remediation (p = .024), and criticism (p = .051) than control professors. There was no significant difference between the two groups in frequency of acceptance reactions. Descriptive statistics reveal that the trained professors used remediation reactions (39%) as much as acceptance (39%), while the control professors used more acceptance (51%) than the other three categories combined. (See Figure 1)

3. Do college professors who are trained in sex equitable and effective interaction skills show a more equitable distribution of classroom interactions to male and female students than college professors who are not trained?

For each observation, the coefficient of distribution (which corrects for differences in the proportion of males and females in attendance) was calculated. Based on these coefficients of distribution, a median coefficient was computed for each professor. A median test determined the level of statistical difference between control and experimental professors.

Statistical analysis revealed that the trained professors were closer to eliminating sex bias than the non trained professors at a significant level (p = .001). In the control classes, males received considerably more interactions than females (c.o.d. = .121). In the trained classrooms, the

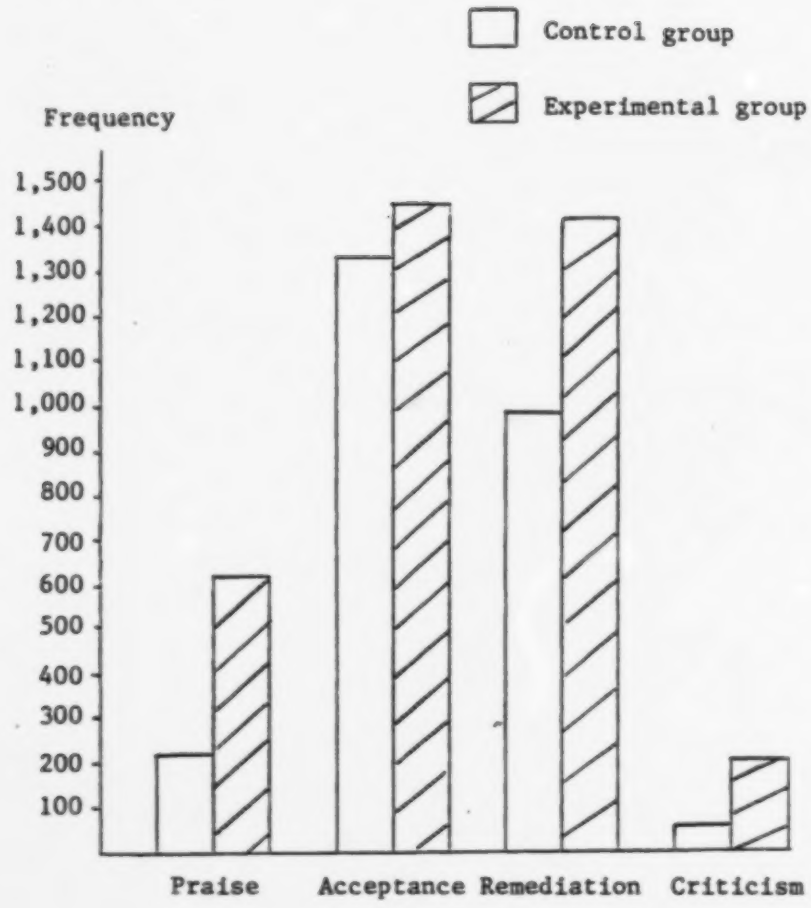

Fig. 1 Frequency bar chart of intellectual praise, acceptance, remediation, and criticism teacher reactions in control and experimental groups.

distribution of interactions was close to equity (c.o.d. = .016). (See Tables 3 and 4).

4. Is there a difference between the experimental and control group in the distribution of teacher reactions by gender in each of the categories of Praise, Acceptance, Remediation, and Criticism?

To test for differences in the distribution of teacher reactions to female and male students in the two groups, a median coefficient of distribution for each category was determined for each professor based upon the three observations. Four median tests were calculated to determine if thee were significant differences between the experimental and control groups on the coefficients of distribution for each category.

In all four categories, the trained professors were closer to equity than their control counterparts. In the category of acceptance, the results indicate that highly significant male bias (p = .0001) was demonstrated in the control group (c.o.d. = .175), while approximate equity was achieved in the experimental group (c.o.d. = -.001). Significant male bias was also shown in the control group in the category of remediation (p = .041). In the less frequently used categories, praise and criticism, females received more praise and criticism in both the control and experimental groups, though not at a significant level.

5. Does training in sex equitable and effective interaction skills result in a significantly smaller percentage of salient students in the experimental group versus the control group?

Salient students were identified as those students receiving three or more times their proportional share of

TABLE 3

MEDIAN COEFFICIENTS OF DISTRIBUTION FOR OVERALL INTERACTIONS

Group	n	Median c.o.d.	Range Q_3-Q_1	Minimum Value	Maximum Value
Control	23	.121	.167	-.098	.425
Experimental	23	.016	.107	-.190	.116

TABLE 4

MEDIAN TEST ON COEEFFICIENT OF DISTRIBUTION FOR OVERALL INTERACTIONS

Group	n	Scores	Expected
Control	23	17.00	11.50
Experimental	23	6.00	11.50
Chi-square = -10.298			
df = 1			
p > chi-square = .001			

teacher-student interactions. For example, in a classroom of 20 students with 60 interactions occurring during a class period, each student's proportional share of interactions with the professor would be three. In this hypothetical classroom, students participating in nine of more interactions with the professor would be considered salient.

I-test analysis comparing the mean percentages of salient students identified in the control ($x = 9.6\%$) and experimental ($x = 7.2\%$) groups was significant at $p = .05$ (one-tailed). Therefore, the training program reduced the number of salient students and increased the distribution of interaction to other students in the class. Descriptive data show there are more salient males than females in the control group at an approximate ratio of three males to two females. In the trained group, approximate equity was attained in the frequency of males and females identified as salient students. (See Tables 5 and 6).

6. Does training in sex equitable and effective interaction skills reduce the percentage of silent students in the experimental group versus the control group?

Since research indicates that active classroom participation is positively correlated with student achievement and attitudes toward school, an effective teacher training program should decrease the number of non-participating or silent students.

I-test analysis comparing the mean percentages of silent students identified in the control ($x = 45\%$) and experimental ($x = 27\%$) group indicates that the training reduced the number of silent students at a significant level ($p = .005$). Descriptive data further reveal that 33 percent more silent

TABLE 5

SALIENT STUDENTS: DESCRIPTIVE DATA COMPARING THE FREQUENCY AND PERCENTAGE OF SALIENT STUDENTS OCCURRING IN THE CONTROL GROUP VERSUS EXPERIMENTAL GROUP

Control Group		Experimental Group	
Salient males	70	Salient males	39
Salient females	44	Salient females	34
Total salient students	114	Total salient students	73
Mean % salient students	9.2	Mean % salient students	7.23

TABLE 6

T-TEST FOR DIFFERENCE IN MEAN PERCENTAGE OF SALIENT STUDENTS OCCURRING IN THE CONTROL VERSUS EXPERIMENTAL GROUP

Group	n	Mean % Salient Students	SD	t	df	p (One-tailed)
Control	21	.096	.035	1.98	40	> .05
Experimental	21	.072	.042			

females than silent males were identified in the control group, whereas almost equal numbers of silent females and males were identified in the trained group. (See Tables 7 and 8).

Summary

The following descriptions of the "typical" control and experimental classrooms summarizes each research question by using the average (or mean) distribution of interactions for each question. During the first 5 minutes of observation, the observer recorded nominal data concerning the class and drew a diagram of the student seating arrangement depicting gender. For the next 40 minutes, observers coded all teacher-student interactions using categories which provided a comprehensive picture of the initiation and distribution of a classroom interaction (INTERSECT, Section B). These 40-minute coded observations provided the data for the following "typical" classroom:

The typical (mean) control classroom (40-minute periods). The typical (mean) control classroom has one interaction per minute, with males receiving more interactions that expected and females receiving fewer interactions than expected ($p = .001$). In this control classroom, the 40 teacher reactions typically include 21 acceptances, 15 remediations, 3 praises, and 1 criticism. Control professors rely on acceptance, the "O.K." response, more than all three other categories combined. Significant males bias is shown in teacher acceptance ($p = .0001$) and remediation ($p = .041$) reactions to students. Gender is not a significant factor in teacher praise and criticism reactions to students, in part, because so few are given. In

TABLE 7

SILENT STUDENTS: DESCRIPTIVE DATA COMPARING THE FREQUENCY AND PERCENTAGE OF SILENT STUDENTS OCCURRING IN THE CONTROL VERSUS EXPERIMENTAL GROUP

Control Group		Experimental Group	
Silent males	244	Silent males	152
Silent females	325	Silent females	154
Total silent students	569	Total silent students	306
Mean % of silent students	45	Mean % of silent students	27

TABLE 8

T-TEST FOR DIFFERENCE IN MEAN PERCENTAGE OF SILENT STUDENTS OCCURRING IN THE CONTROL VERSUS EXPERIMENTAL GROUP

Group	n	Mean % Silent Students	SD	t	df	p (One-tailed)
Control	21	45	23%	2.76	40	> .005
Experimental	21	27	19%			

this typical control classroom, 10 percent of the students are salient, accounting for approximately a quarter of all interactions. Forty-five percent of the students interact with the professor one or two times; forty-five percent remain silent. Descriptive statistics reveal that salient students are more often males and that silent students are more often females in the control classroom.

The typical (mean) trained (treatment of experimental) classroom (40-minute period). The typical (mean) experimental classroom has 1.4 interactions per minute, with males receiving slightly more interactions than females, although the distribution of interactions is near equity (median coefficient of distribution overall - .016). In the experimental classroom, the teacher reactions typically include 21 acceptance and 21 remediation reactions, 9 praise, and 3 criticism reactions. Approximate equity is achieved in the category of teacher praise reactions (-.006) and acceptance (-.001), with males receiving slightly more remediation reactions (.027) and females receiving slightly more criticism reactions (-.105). In this experimental classroom, 7 percent of the students are salient (receiving three times or more their proportional share of interactions). Sixty-six percent of the students are interactive, participating in at least one or more teacher-student interaction. Twenty-seven percent of the students remain silent. In the experimental classroom, approximate equity is achieved in saliency as well as in the proportion of males and females who remain silent.

"Student involvement, high expectations, assessment and feedback have been cited as the necessary ingredients for

fostering true educational effectiveness, but how do colleges and universities translate this philosophy into practice?" (Astin, 1985, p. 35). This study clearly provides one answer to this provocative question. A faculty training program in sex equitable and effective interaction skills increases educational effectiveness by:

1. Involving many more students, both men and women, in the heart of the teaching-learning process, teacher-student interaction

2. Increasing the range and precision of teacher feedback to students' questions, answers, and comments

3. Reducing the number of salient students who monopolize interaction while also reducing the number of silent students, the "invisible" members of the classroom

It is disturbing to note that only 62 words are devoted to the subheading Eliminating Sexual Bias in a newly published text on secondary and middle school teaching methods. The authors suggest that teachers take care that neither their teaching techniques nor materials reflect sexual bias. They state, "Your own good judgment should be sufficient to guide you in this aspect of your teaching" (Clark and Starr, 1986, p. 339). We strongly contest that statement. Teaching is an active and intentional process. Teachers can no longer rely on good judgment and content alone to be effective. As teachers become aware of differences in the way they interact with male and female students, and as they receive appropriate training, they become more equitable and precise in their response behavior to all students.